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(19) (CA) **CANADIAN PATENT** (12)

(54) **Footwear Sole**

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FOOTWEAR SOLE

This invention relates to soles for footwear.

The invention provides means for regulating the rotational movement, or twist, between the forefoot and rearfoot portions of a sole whilst providing longitudinal stiffness of the sole when an article of footwear incorporating the sole is in use.

The invention is especially advantageous for use in sports and casual footwear, for example training shoes, running and other athletic shoes, racket and field game shoes, and plimsolls, but may be useful also in other types of footwear.

According to the present invention there is provided a sole for footwear, wherein the sole incorporates a cruciate tension member located predominantly between the forefoot and rearfoot portions of the sole, the general directions of the linear elements of the cruciform being oblique in relation to the longitudinal axis of the sole, and the position at which the linear elements of the cruciform intersect being substantially in the shank portion of the sole.

It is found that, by means of such a tension member, it is possible to provide an advantageously controlled restraining force on the twisting of the sole which frequently tends to occur in use, especially for sports and play usage, without detriment to the desired longitudinal flexibility/stiffness of the sole.

The tension member cruciform typically is oriented obliquely to the longitudinal axis of the sole, i.e. it has a general 'x' configuration as opposed to a '+' configuration in relation to the sole length. It is essentially a single cruciform, i.e. it is not part of a grid pattern of similar cruciforms.

The linear elements of the cruciform need not be orthogonal at the cruciform intersect. Suitably the intersection angles facing forwardly and rearwardly are up to 90°, preferably acute, and the laterally facing angles are at least 90°, preferably obtuse.



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the rearward outside edge and the forward inside edge of the sole is designed to provide a greater degree of torsional stiffness or sole twist-restraint between its ends than that of the other element.

At least one of the elements may extend to at least one of the lateral edges of the sole, preferably the outside edge, and may be continued in the sidewall of the sole.

In one preferred embodiment, one of the elements extends from the outside edge of the sole adjacent to the heel portion towards the medial inside edge of the sole behind the forefoot flex area and may extend completely to the medial inside edge. The other element may extend from a position near to the inside edge of the sole adjacent to the heel portion towards the medial outside edge of the sole behind the forefoot flex area and may extend completely to the medial outside edge.

The tension member may be incorporated only in the outsole, or in both the outsole and midsole, or only in the midsole, if desired in association with an appropriate cut-away feature in the outsole through which the member would be visible. The member elements may be substantially uniplanar with the sole or at least one of the elements may intersect the general plane of the sole especially when the tension member is incorporated at least partially in the midsole.

Preferably the tension member does not project significantly outwardly of the surface plane of the outsole since such projection could be uncomfortable to the wearer.

The tension member may be produced simultaneously during moulding of the sole. Alternatively, the tension member or the elements thereof may be produced separately and then attached into the sole, for instance by bonding.

The main body of the outsole may be of a rubber material normally employed for outsoles of sports shoes.

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and the like; for instance a material based on a blend of synthetic and natural rubber.

When the tension member is formed as an integral part of, and of the same material as, the shank portion of the sole, especially the outsole, such as when the tension member is formed during moulding of the sole, the thickness of the shank portion area adjacent to at least the central part of the member should be less than the thickness of the tension member in order to allow the member to exert its requisite effect. Suitably this thinner area is embodied as a 'depressed area', i.e. an area of the shank portion having a surface level below that of a substantial part, usually a major part, of the tension member. The peripheral shape and dimensions of the depressed area may be various, provided that they are sufficient to enable the tension member to exert the required twist-restraining force. The peripheral shape may be substantially polygonal (e.g. quadrilateral) or curved (e.g. circular, elliptical or undulated) or a combination thereof. The depth of the area below the surface level of the tension member may be uniform throughout the area or it may vary, for instance the depth may lessen, i.e. taper, towards at least part of the area perimeter. An example of a suitable depth is about 4 to 5 millimetres, for an adult's shoe sole of average size, at least immediately adjacent to the tension member.

When the tension member elements are of different material to that of the shank portion incorporating the tension member, a depressed area may not be necessary. Such tension member elements may be of organic polymeric material. Examples of polymers which may be employed for the elements are thermoplastic polyester elastomers, for instance that available under the trade name 'Hytrel', and thermoset plastics such as aromatic polyamides, for instance that available under the trade name 'Kevlar'. A blend of polymers may be employed, for instance a blend of one of the

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aforementioned polymers with a rubber which may be a rubber employed in the main body of the sole. If desired, at least one of the tension member elements may comprise a coloured core of material having the requisite torsional stiffness encased by a clear plastics material. One example of a suitable casing plastics material is that available under the trade name 'Nucrel'.

The outsole may have surface features such as studs, channels, ridges, etc, which frequently are included to confer properties such as grip, wear resistance, flexibility, appearance, etc.

The invention is illustrated, by way of example only, in the accompanying drawings, Figures 1 to 3, which are diagrammatic representations of a right-foot sole.

Figure 1 shows a schematic plan view representation of the linear elements ABC and DBE of a cruciate tension member in accordance with the invention, B being the cruciform intersect, inside a footwear sole outline. In the representation, the angles ABD and CBE are acute and the angles ABE and CBD are obtuse. Preferably, the element ABC has a torsional stiffness between its ends A and C which is greater than the torsional stiffness between the ends D and E of element DBE.

Figure 2 shows a bottom plan view of an embodiment of a sole incorporating a cruciate tension member, in accordance with the invention, and Figure 3 shows a left-hand side view of the sole of Figure 2.

With reference to Figures 2 and 3, the sole comprises an outsole of moulded rubber material incorporating a cruciate tension member (1) consisting of two linear elements (2,3) having a ribbed surface pattern. One of the elements (2) is thicker than the other element (3), to confer a greater tensile stiffness on that element (2). Both elements extend completely to the outside edge (4) of the sole and are shown to

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terminate at corresponding patterns (5,6) in the sole sidewall (Figure 3). The central major part of the tension member (1) is surrounded by a depressed area (7) having a perimeter (8). The depth of the surface of the depressed area (7) below the surface level of the tension member (1) is substantially uniform throughout the area (7) and may be about 4 mm.

Either or both of the elements (2,3) may be lengthened to terminate near to the inside edge (12) of the sole, if desired.

The illustrated sole has forefoot flex bars comprising grooves (9), positioned approximately just behind the joint of the metatarsus with the phalanges of the right foot of a wearer of footwear having the sole. The illustrated sole also has other surface profile patterned areas providing enhanced wear-resistance (10) and grip (11). It will be appreciated that the illustrated surface patterns are shown merely by way of example and are not essential to the invention.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Footwear sole having a main body portion comprising a forefoot portion, a shank portion, a rearfoot portion and a peripheral sidewall; said sole incorporating a cruciate tension member located predominantly between the forefoot and rearfoot portions of the sole; said cruciate tension member being a cruciform comprising two intersecting linear elements each of which extends between the forefoot and rearfoot portions of the sole; the general directions of the linear elements of the cruciform being oblique in relation to the longitudinal axis of the sole; the position at which the linear elements of the cruciform intersect being substantially in the shank portion of the sole; and each of the linear elements of the cruciform has a torsional stiffness selected to provide a restraining force on twisting of the sole when an article of footwear incorporating the sole is in use by a wearer.
2. Sole according to Claim 1 wherein the tension member comprises a linear element directed between the rearward outside edge and the forward inside edge of the sole which is designed to provide a greater degree of torsional stiffness between its ends than that of the other linear element.
3. Sole according to Claim 1 wherein the tension member is located substantially between the heel portion of the sole and the area of the forefoot portion of the sole which corresponds with a position just behind the joint of the metatarsus with the phalanges of the foot of a wearer of an article of footwear incorporating the sole.
4. Sole according to Claim 1, 2 or 3 wherein at least one of the linear elements of the tension member extends from a position adjacent to the heel portion of the sole.
5. Sole according to Claim 1, 2 or 3 wherein the angles of intersection of the linear elements facing forwardly and rearwardly of the sole are acute and the angles of intersection of the linear elements facing laterally of the sole are obtuse.

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6. Sole according to Claim 1, 2 or 3 wherein the intersection of the linear elements occurs in the middle third of the width of the sole in the shank portion.
7. Sole according to Claim 1, 2 or 3 wherein the tension member is of integral construction.
8. Sole according to Claim 1, 2 or 3 wherein the tension member comprises separate linear elements.
9. Sole according to Claim 1, 2 or 3 wherein one of the linear elements extends from the outside edge of the sole adjacent to the heel portion towards the inside edge of the sole behind the area of the forefoot portion of the sole which corresponds with a position just behind the joint of the metatarsus with the phalanges of the foot of a wearer of an article of footwear incorporating the sole, and the other linear element extends from a position near to the inside edge of the sole adjacent to the heel portion to the outside edge of the sole behind said area of the forefoot portion.
10. Sole according to Claim 1, 2 or 3 wherein at least one of the linear elements extends to at least one of the lateral edges of the sole and is continued in the sidewall of the sole.
11. Sole according to Claim 1, 2 or 3 wherein the tension member is incorporated at least partly in the outsole.
12. Sole according to Claim 1, 2 or 3 wherein the tension member is incorporated at least partly in the midsole.
13. Sole according to Claim 1, 2 or 3 wherein the tension member does not project significantly outwardly of the surface plane of the outsole.
14. Sole according to Claim 1, 2 or 3 wherein at least one of the linear elements of the tension member has a ribbed surface profile longitudinally of the element.
15. Sole according to Claim 1, 2 or 3 wherein at least one of the linear elements of the tension member has a degree of linear curvature.
16. Sole according to Claim 1, 2 or 3 wherein the tension member is formed as an integral part of the shank portion of the outsole and wherein at least the central part of the tension member is surrounded by an area

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having a lower surface level.

17. Sole according to Claim 1, 2 or 3 wherein at least one of the linear elements of the tension member comprises a material which is different to that of the main body of the sole.
18. Sole according to Claim 1, 2 or 3 wherein at least one of the linear elements comprises a coloured core of material having the requisite torsional stiffness encased by a clear plastics material.
19. Article of footwear having a sole according to Claim 1, 2 or 3.
20. Sports shoe having a sole according to Claim 1, 2 or 3.



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ABSTRACT

FOOTWEAR SOLE

A footwear sole incorporates a cruciate tension member located predominantly between the forefoot and rearfoot portions of the sole, the general directions of the linear elements of the cruciform being oblique in relation to the longitudinal axis of the sole, and the position at which the linear elements of the cruciform intersect being substantially in the shank portion of the sole. The tension member provides a restraining force on the twisting of the sole which frequently tends to occur in use, especially in sports and play usage, without detriment to the longitudinal flexibility/stiffness of the sole.

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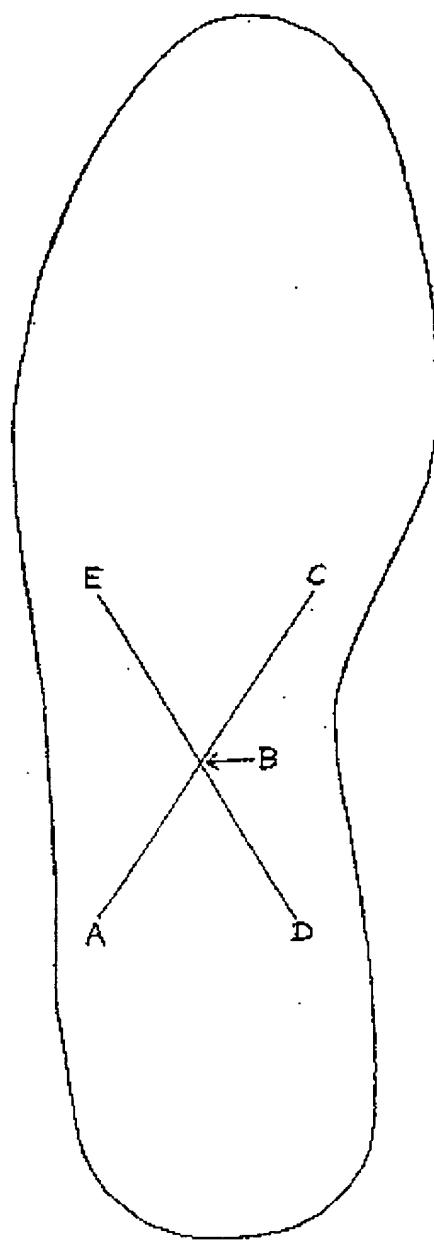


Figure 1

MCCARTHY TETRAULT
AGENTS FOR THE APPLICANT

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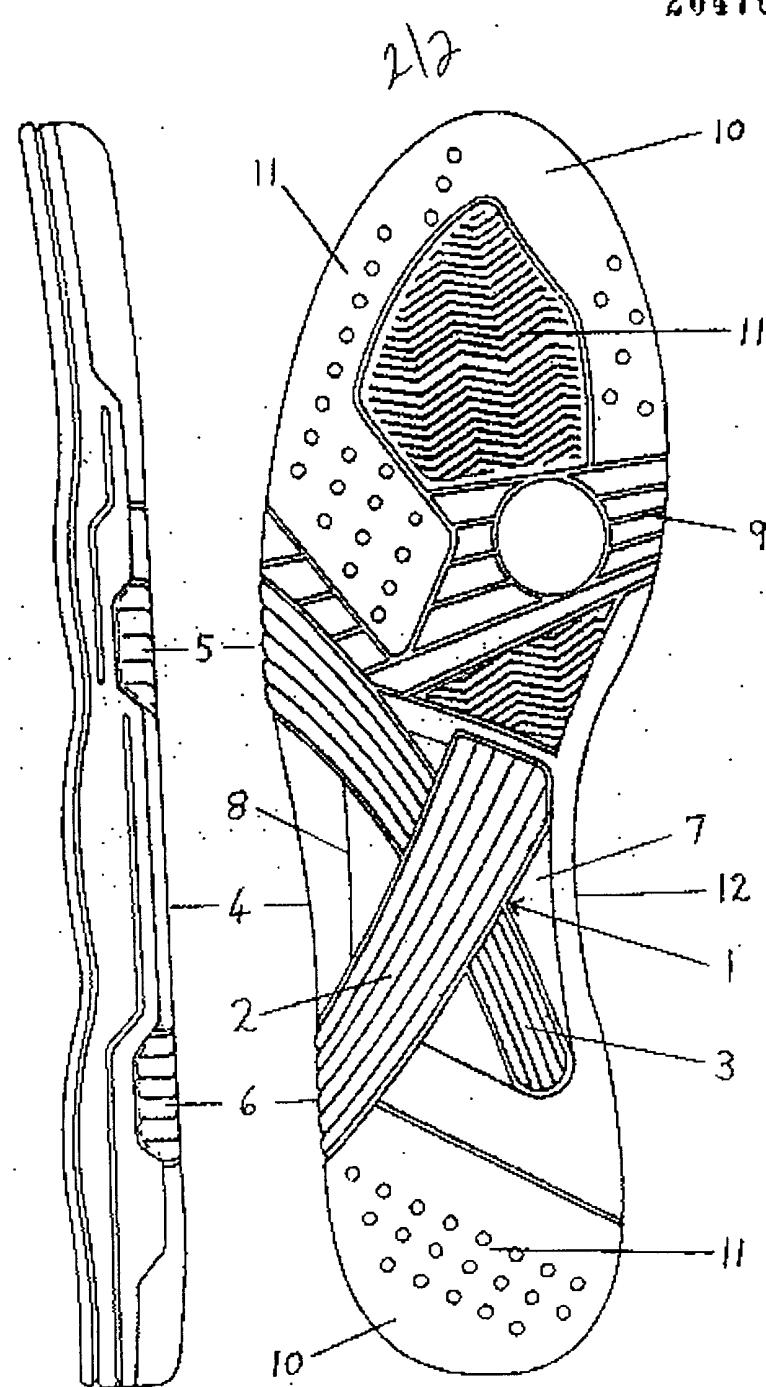


Figure 3

Figure 2

1. CAPACITY TO ALLOW
2. ZONE FOR THE APPLICANT

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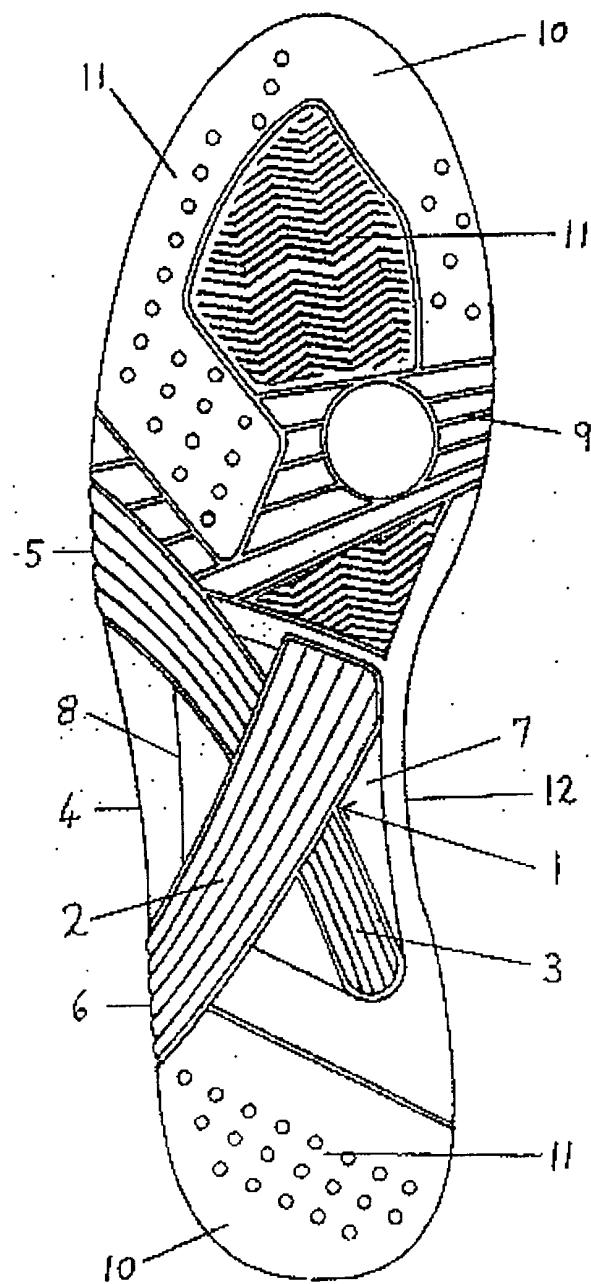
(12) Patent:

(11) CA 2047044

(54) FOOTWEAR SOLE

(54) SEMELLE DE CHAUSSURE

Representative Drawing:



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ABSTRACT:

A footwear sole incorporates a cruciate tension member located predominantly between the forefoot and rearfoot portions of the sole, the general directions of the linear elements of the

cruciform being oblique in relation to the longitudinal axis of the sole, and the position at which the linear elements of the cruciform intersect being substantially in the shank portion of the sole. The tension member provides a restraining force on the twisting of the sole which frequently tends to occur in use, especially in sports and play usage, without detriment to the longitudinal flexibility/stiffness of the sole.

CLAIMS: Show all claims

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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